Joint Analysis of Longitudinal and Survival AIDS Data – a Bayesian perspective

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One-day Workshop on Spatial-Temporal Models in Epidemiology and Health

Spatial Joint Analysis for AIDS Data

- **Longitudinal Model**

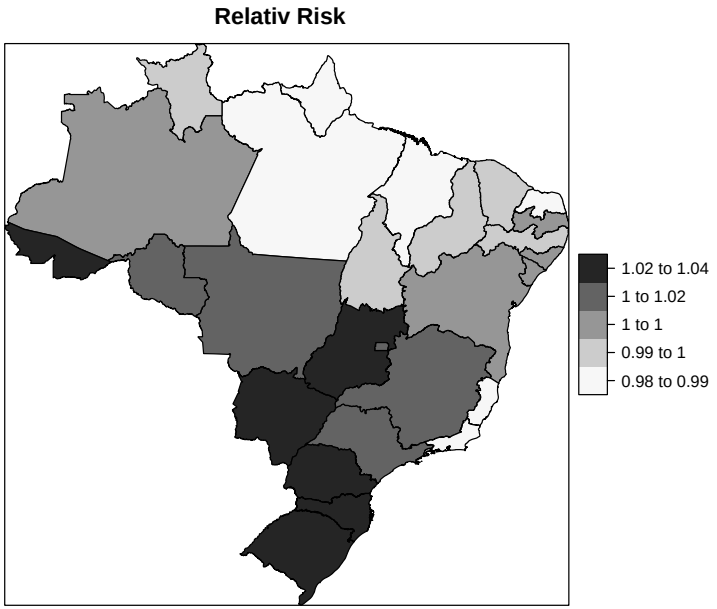
$$y_{ikj} = \mu_{ik}(t_{ikj}) + W_{1ik}(t_{ikj}) + \epsilon_{ikj}$$

  - $y_{ikj} = \sqrt{\text{CD4}}$: j-th count for the individual $i = 1, \ldots, n_k$ living in the $k = 1, \ldots, K$ region
  - $W_{ik}(t) = (W_{1ik}(t), W_{2ik}(t))$: zero-mean latent bivariate Gaussian process
  - $W_{1ik} = U_{1ik} + U_{2ik} t_{ikj}$
  - $(U_{1ik}, U_{2ik}) \sim N_2(\mathbf{0}, \mathbf{\Sigma})$

- **Survival Model**

$$T_{ik} \sim \text{Weibull}(r, \mu_{ik}(t))$$

  - $\log(\mu_{ik}(t)) = \mathbf{x}_{2ik}^T(t)\boldsymbol{\beta}_2 + W_{2ik}(t) + Q_k$
  - $W_{2ik} = \gamma_1 U_{1ik} + \gamma_2 U_{2ik}$.
  - $Q_k | \sigma_Q^2 \sim ICAR(\sigma_Q^2)$: spatial frailty



Acknowledgments

Maria Goretti Pereira Fonseca Medeiros e Cláudia Medina Coeli (FioCruz) for providing us the data set.

This research was partially supported by the projects PTDC/MAT/118335/2010 and FCT Pest-OE/MAT/UI0006/2011.